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(71) Applicant *(for all designated States except US)*: THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: KOTANI, Taeko [JP/JP]; 2-3-3-803 Tanaka-cho, Higashinada-ku, Kobe 658-0081 (JP). LEW, Kok, Hin [US/JP]; Sukhsagar Mansion 3F, 1-3-16 Kumochi-cho, Chuo-ku, Kobe 651-0056 (JP).

(74) Agents: REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217-1087 (US).

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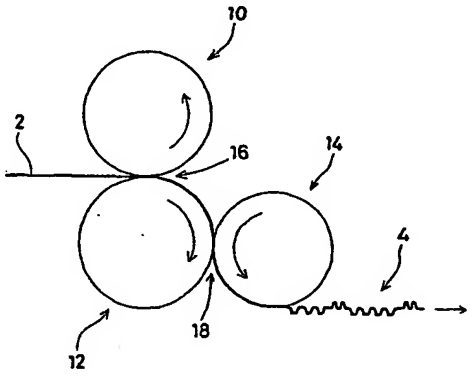
(54) Title: METHOD OF EMBOSSING A CELLULOSIC FIBROUS WEB AND EMBOSSED CELLULOSIC FIBROUS WEB MADE THEREBY



(57) Abstract: A method of embossing a cellulosic fibrous web is disclosed. The embossing pattern comprises a first embossing pattern having firs embossed elements and a second embossing pattern having second embossed elements. The method comprises embossing the web in a first embossing nip formed between a first rigid roll (10) and a second rigid roll (12), and embossing the web in a second embossing nip formed between the second rigid roll and a resilient roll (14). The first rigid roll (10) has a pattern of first male elements, the second rigid roll (12) has a pattern of female elements and a pattern of second male elements. The pattern of first male elements is arranged to engage the pattern of female elements as the rolls rotate such that the engagement of the patterns provides the web with the first embossing pattern. The pattern of second male elements is arranged to maintain noncontact with the first rigid roll (10) as the rolls rotate such that the pattern of second male elements substantially does not provide an embossing pattern on the web in the first embossing nip. The pattern of second male elements is arranged to maintain contact with the resilient roll (14) so as to provide the web with the second embossing pattern. A cellulosic fibrous web made by the method is also disclosed.

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METHOD OF EMBOSSING A CELLULOSIC FIBROUS WEB AND EMBOSSED CELLULOSIC FIBROUS WEB MADE THEREBY

FIELD OF THE INVENTION

The present invention relates to a method of embossing a cellulosic fibrous web. More particularly, the present invention relates to a method of embossing a cellulosic fibrous web to provide an embossing pattern on the web. The embossing pattern comprises a first embossing pattern having first embossed elements and a second embossing pattern having second embossed elements. The present invention also relates to an embossed cellulosic fibrous web made by the method.

BACKGROUND

Cellulosic fibrous web, such as tissue products, are in almost constant use in daily life. Toilet tissue, paper towels, and facial tissue are examples of cellulosic fibrous web used throughout home and industry. Although such a cellulosic fibrous web which remains unaltered from the base sheet has been long accepted by consumers, there is a need for cellulosic fibrous web having an aesthetic appearance. The aesthetic appearance of the cellulosic fibrous web gives consumers the impression of high quality products. It is also desirable to give the cellulosic fibrous web bulk. The property of bulk is desirable for high quality products because it is associated with softness and absorbency from consumer standpoint. Embossing patterns are common to impart aesthetic appearance and bulk to the cellulosic fibrous web.

There are a number of approaches to provide an embossing pattern on the cellulosic fibrous web. One of the approaches is to let the web pass through a nested embossing nip formed between two rigid rolls (e.g., steel rolls). One of the steel rolls has a pattern of male elements and the other of the steel rolls has a pattern of female elements. The male elements and the female elements are arranged to engage as the rolls rotate to provide an embossing pattern on the web. Another approach is to let the web pass through an embossing nip formed between a rigid roll and a resilient roll (e.g., a steel roll and a rubber roll). The steel roll has a pattern of male elements which is pressed against the rubber roll. While the steel to steel nested embossing needs a clearance and precise registration between the rolls to prevent causing damages on the rolls as a result of interference, the steel to rubber embossing does not necessarily require the clearance. Rather, the steel to rubber embossing requires pressure between them to impress an embossing pattern on the intervening web. The rubber roll is resilient against the pressure by the steel roll and capable of deforming upon the pressure. By pressing the web by the pattern of male elements of the steel roll against the rubber roll, the web is provided with the embossing pattern thereon. Typically, the embossing pattern provided on the web by the steel to rubber embossing is visually clearer to the consumers than the embossing pattern provided by the steel to steel embossing because the web is more impressed between the steel to rubber embossing nip than the steel to steel embossing nip. Further, the steel to rubber embossing is capable of giving greater deflection of smaller aesthetic embossed pattern at a lesser extent of physical damages to the web. Thus, the steel to steel embossing and the steel to rubber embossing provide embossing patterns having different visual characteristics to the consumers from one another. Applying the embossing patterns having different visual characteristics would be beneficial from aesthetic standpoint. However, it makes the system costly because it requires different embossing systems.

There is a system providing a pair of nips for two embossing operations utilizing a single rigid roll with two resilient rolls. The web passes through the pair of nips formed by one rigid roll and two resilient rolls. Such a system is disclosed in, e.g., U.S. Patent 5,269,983 issued to Schulz on December 14, 1993 (especially refer to FIG. 5), and U.S. Patent 5,779,965 issued to Beuther et al. on July 14, 1998. However, the embossing pattern on the web provided by one nip and the embossing pattern provided by the other nip are maintained to register on the web. Therefore, the embossing system disclosed herein provides only one embossing pattern on the web.

Thus, there is a need for a method of embossing a cellulosic fibrous web to provide embossing patterns having different visual characteristics on the cellulosic fibrous web by utilizing a simple system.

SUMMARY

The present invention relates to a method of embossing a cellulosic fibrous web. The embossing pattern comprises a first embossing pattern having first embossed elements and a second embossing pattern having second embossed elements. The method comprises embossing the web in a first embossing nip formed between a first rigid roll and a second rigid roll, and embossing the web in a second embossing nip formed between the second rigid roll and a resilient roll. The first rigid roll has a pattern of first male elements, the second rigid roll has a pattern of female elements and a pattern of second male elements. The pattern of first male elements is arranged to engage the pattern of female elements as the rolls rotate such that the engagement of the patterns provides the web with the first embossing pattern. The pattern of second male elements is arranged to maintain noncontact with the first rigid roll as the rolls rotate such that the pattern of second male elements substantially does not provide an embossing pattern on the web in the first embossing nip. The pattern of second male elements is arranged to maintain contact with the resilient roll so as to provide the web with the second embossing pattern.

The present invention also relates to an embossed cellulosic fibrous web made according to the method above. In the embossed cellulosic fibrous web, the first embossed elements and the second embossed elements extend opposite one another. The first embossing pattern comprises a background matrix and a plurality of discrete, distinctive lands. The background matrix is formed by the first embossed elements. The discrete, distinctive land is defined by being substantially surrounded by the first embossed elements. The second embossed elements are arranged to form a decorative indicia inside of the discrete, distinctive land.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as forming the present invention, it is believed that the invention will be better understood from the following description which is taken in conjunction with the accompanying drawings in which:

FIG. 1 is a schematic side view of an embossing system in accordance with the present invention;

FIG. 2 is a plan view of a cellulosic fibrous web having an embossing pattern comprising a first embossing pattern and a second embossing pattern formed in accordance with the present invention;

FIG. 3 is a plan view of a cellulosic fibrous web having the first embossing pattern of the cellulosic fibrous web shown in FIG. 2;

FIG. 4 is a plan view of a cellulosic fibrous web having the second embossing pattern of the cellulosic fibrous web shown in FIG. 2;

FIG. 5 is a cross sectional view of the cellulosic fibrous web shown in FIG. 3 taken along a V-V line;

FIG. 6 is a cross sectional view of the cellulosic fibrous web shown in FIG. 4 taken along a VI-VI line;

FIG. 7 is a cross sectional view of the cellulosic fibrous web shown in FIG. 2 taken along a VII-VII line;

FIG. 8 is an enlarged cross sectional view of the first position of the first embossing nip in the embossing system shown in FIG. 1;

FIG. 9 is an enlarged cross sectional view of the second position of the first embossing nip in the embossing system shown in FIG. 1; and

FIG. 10 is an enlarged cross sectional view of the second embossing nip in the embossing system in FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

"Comprising" means that other steps and other elements which do not affect the end result can be added. This term encompasses the terms "consisting of" and "consisting essentially of".

Illustrated in FIG. 1 is an embossing system used for cellulosic fibrous web for consumer paper products. The embossing system includes a first rigid roll 10, a second

rigid roll 12, and a resilient roll 14. The first rigid roll 10 and the second rigid roll 12 forms a first embossing nip 16 therebetween. The second rigid roll 12 and the resilient roll 14 forms a second embossing nip 18 therebetween. Thus, the second rigid roll 12 is mutually used to form the first embossing nip 16 and the second embossing nip 18. This enables a simple structure to provide embossing patterns having different visual characteristics on the web. In the system shown in FIG. 1, the cellulosic fibrous web 2, such as toilet tissue, paper towels, and facial tissue, is conveyed generally from the left to the right in the drawing shown in FIG. 1 through the first embossing nip 16 and the second embossing nip 18 in its order. Alternatively, the cellulosic fibrous web 2 may be conveyed generally from the right to the left in the drawing shown in FIG. 1 through the second embossing nip 18 and the first embossing nip 16 in its order. In either case, the cellulosic fibrous web 2 is provided an embossing pattern 4 as an effect of the first embossing nip 16 and the second embossing nip 18.

Before explaining the detail of the embossing system of the present invention, one embodiment of the cellulosic fibrous web which could be made by the embossing system of the present invention is explained referring to FIGS. 2 - 7. It should be noted that the description below relevant to FIGS. 2 - 7 and drawings in FIGS. 2 - 7 are provided for better understanding of a cellulosic fibrous web which could be made according to the method of the present invention, and many other embodiments of the cellulosic fibrous web made according to the method of the present invention are possible. Referring to FIG. 2, the cellulosic fibrous web 2 extends in two directions; machine direction MD and cross machine direction CD. Herein, "machine direction", designated MD, is the direction parallel to the flow of paper through the papermaking equipment. Herein, "cross machine direction", designated CD, is the direction perpendicular to the machine direction in the X-Y plane. The cellulosic fibrous web 2 has an embossing pattern 4 on it. The embossing pattern 4 comprises a first embossing pattern 122 (refer to FIG. 3 which shows a plan view of a cellulosic fibrous web having the first embossing pattern) and the second embossing pattern 124 (refer to FIG. 4 which shows a plan view of a cellulosic fibrous web having the second embossing pattern).

The first embossing pattern 122 has a plurality of first embossed elements 128 as shown in FIG. 3, where the first embossed element 128 is shown as a black element. The first embossing pattern 122 comprises two patterns; one of which is a background matrix 130, and the other of which is a plurality of discrete, distinctive lands 132. The background matrix 130 is formed by a plurality of first embossed elements 128 which are

preferably discrete with one another. The discrete, distinctive land 132 is defined by being substantially surrounded by the first embossed elements 128. Herein, "discrete" means that the adjacent elements are not contiguous with each other. In the embodiment shown in FIG. 3, the adjacent first embossed elements 128 are not contiguous with each other. The adjacent discrete, distinctive lands 132 are also not contiguous with each other. Herein, "distinctive" means that the land is discernible and distinguishable from the background matrix. Herein, "substantially surrounded" means that the land is surrounded by a plurality of embossed elements which do not form a closed line (i.e., the land is not surrounded by a closed line). In the embodiment shown in FIG. 3, the discrete, distinctive land 132 is rendered discernible and distinguishable from the background matrix 130 by not having the first embossed element 128 therein. Preferably, the first embossed element 128 and the discrete, distinctive land 132 are of relatively different level in height. Referring to FIG. 5 as well, the first embossed element 128 is preferably embossed on the cellulosic fibrous web 2, and the discrete, distinctive land 132 is preferably unembossed. Therefore, the discrete, distinctive land 132 is of the same level as the unembossed surface 6 of the cellulosic fibrous web 2, and the first embossed element 128 protrudes from the unembossed surface 6. Alternatively, the discrete, distinctive land 132 may be embossed to be of different level in height from the first embossed element 128. Alternatively, the first embossed element 128 and the discrete, distinctive land 132 may be embossed to be of the same level in height as long as the discrete, distinctive land 132 is discernible and distinguishable from the background matrix 130.

The background matrix 130 is formed by a plurality of first embossed elements 128. The background matrix 130 preferably has a density of from 40 to 90 of the first embossed elements 128 per square inch, more preferably from 45 to 80 of the first embossed elements 128 per square inch, most preferably from 50 to 70 of the first embossed elements 128 per square inch. It is preferable that the background matrix 130 has a density of not less than 40 of the first embossed elements 128 to sustain bulk of the cellulosic fibrous web 2. It is also preferable that the background matrix 130 has a density of not greater than 90 of the first embossed elements 128 to provide efficient nesting between the sheets.

The first embossed element 128 preferably has the area of from 0.006 $inch^2$ to 0.024 $inch^2$, more preferably from 0.009 $inch^2$ to 0.020 $inch^2$, most preferably from 0.010 $inch^2$ to 0.017 $inch^2$. The first embossed element 128 may have any shape, such as circle, oval,

dot, rain drop, hexagon, bow tie, and trident. In the embodiment shown in FIGS. 2 and 3, the first embossed element 128 has a bow tie shape.

The discrete, distinctive land 132 is defined by being substantially surrounded by the first embossed elements 128. In the embodiment shown in FIG. 3, the discrete, distinctive land 132 is surrounded by about twenty of the first embossed elements 128. These first embossed elements 128 are disposed discontinuously to surround the discrete, distinctive land 132. Although the discrete, distinctive land 132 is not surrounded by a closed line, the discrete, distinctive land 132 can be viewed as forming a shape surrounded by an outline shown by a dotted line 134 in FIG. 3. The dotted outline 134 is substantially surrounded by a plurality of the first embossed elements 128 and defined as a boundary between the discrete, distinctive land 132 and a plurality of the first embossed elements 128. The discrete, distinctive land 132 preferably has the size corresponding to the size eliminating from 4 to 90 of the first embossed elements 128 from the background matrix 130, more preferably the size eliminating from 8 to 70 of the first embossed elements 128 from the background matrix 130, most preferably the size eliminating from 10 to 60 of the first embossed elements 128 from the background matrix 130. If the first embossed element 128 is partly cut, the fraction of the discrete element 20 may be remained to form a portion of the background matrix 130. The other fraction of the first embossed elements 128 may be eliminated to form a discrete, distinctive land 132. In this case, therefore, the number of the first embossed element 128 eliminated from the background matrix 130 should include these eliminated fractions of the first embossed elements 128. It is preferable that the discrete, distinctive land 132 has the size eliminating not less than 4 of the first embossed elements 128 so that the discrete, distinctive land 132 is recognizable and clear to the consumers for aesthetics. It is also preferable that the discrete, distinctive land 132 has the size eliminating not more than 90 of the first embossed elements 128 so that the unembossed discrete, distinctive land 132 does not disrupt the nesting of the tissue sheets when the sheets are wound in a roll or piled in a box.

The embossing pattern 4 has two or more of a composite repeating pattern 136 (refer to FIG. 2) repeating in the machine direction MD. One composite repeating pattern 136 comprises one first repeating pattern 142 of the first embossing pattern 122 (refer to FIG. 3) and one second repeating pattern 144 of the second embossing pattern 124 (refer to FIG. 4). One first repeating pattern 142 includes a plurality of discrete, distinctive lands 132 and a background matrix 130. One repeating pattern in MD can be determined

by comparing contiguous patterns having the same length in MD. When the contiguous patterns having the same length in MD are the same along the MD of the product, the pattern is a repeating pattern. One repeating pattern in CD may be determined as a width of the product. Therefore, the area of one repeating pattern can be defined by the length in MD of one repeating pattern of the product and the width in CD of the product (i.e., (area) = (length in MD of one repeating pattern of product) x (width in CD of product)). The total area of the discrete, distinctive lands 132 in one first repeating pattern 142 preferably occupies from 3 % to 35 % of the area of one first repeating pattern 142, more preferably from 6 % to 28 % of the area of one first repeating pattern 142, most preferably from 10 % to 24 % of the area of one first repeating pattern 142. It is preferable that the total area of the discrete, distinctive lands 132 in one first repeating pattern 142 occupies not less than 3 % so that the discrete, distinctive land 132 is recognizable and clear to the consumers. It is preferable that the total area of the discrete, distinctive lands 132 in one first repeating pattern 142 occupies not more than 35 % so that the unembossed discrete, distinctive land 132 does not disrupt the nesting of the tissue sheets when the sheets are wound in a roll or piled in a box.

The discrete, distinctive land 132 preferably has the area of from 0.025 $inch^2$ to 3.3 $inch^2$, more preferably from 0.076 $inch^2$ to 2.6 $inch^2$, most preferably from 0.125 $inch^2$ to 2.2 $inch^2$. Herein, the area of one discrete, distinctive land 132 is determined by the total area of the first embossed elements eliminated. The outline 134 of the discrete, distinctive land 132 may have any shape, such as circle, oval, square, triangle, diamond, rectangle, hexagon, heart, flower, pound, wavy diamond, and wavy rectangle. In the embodiment shown in FIG. 3, the outline 134 of the discrete, distinctive land 132 has a square-like shape.

The second embossing pattern 124 has a plurality of second embossed elements 138 as shown in FIG. 4, where the second embossed element 138 is shown as a black element. The second embossed elements 138 are arranged to form a decorative indicia 140. The second embossed elements 138 may form any decorative indicia, such as flower, butterfly, and star. Alternatively, it may form words or logo. In the embodiment shown in FIG. 4, the decorative indicia 140 forms a flower. As shown in FIG. 4, the second embossed element 138 forming the decorative indicia 140 is discernible and distinguishable from the remainder of the surface of the cellulosic fibrous web 2. Preferably, the second embossed element 138 and the remainder of the surface of the cellulosic fibrous web 2 are of relatively different level in height. Referring to FIG. 6 as

well, the second embossed element 138 is preferably embossed on the cellulosic fibrous web 2, and the remainder of the surface of the cellulosic fibrous web 2 is preferably unembossed. Therefore, the second embossed element 138 protrudes from the unembossed surface 6 of the cellulosic fibrous web 2.

As shown in FIG. 2, the first embossing pattern 122 and the second embossing pattern 124 are arranged to register when they are formed on the cellulosic fibrous web 2 such that the decorative indicia 140 of the second embossing pattern 124 positions inside of the discrete, distinctive land 132 of the first embossing pattern 122. One second repeating pattern 144 of the second embossing pattern 124 (refer to FIG. 4) may have at least one decorative indicia 140 such that the decorative indicia 140 fills at least one discrete, distinctive land 132 in one second repeating pattern 142. Preferably, one second repeating pattern 144 has a plurality of decorative indicia 140 such that the decorative indicia 140 fill some of the discrete, distinctive lands 132 in one second repeating pattern 142, more preferably such that the decorative indicia 140 fill all of the discrete, distinctive lands 132 in one second repeating pattern 142 as shown in FIG. 2. Referring to FIG. 7 where the first embossing pattern 122 and the second embossing pattern 124 are formed on the cellulosic fibrous web 2, the first embossed element 128 and the second embossed element 138 extend opposite one another with respect to the unembossed surface 6. Therefore, the first embossed element 128 and the second embossed element 138 provide more visual contrast for consumers.

Referring to FIG. 1 again, the cellulosic fibrous web 2 passes through the first embossing nip 16 and the second embossing nip 18 in its order. As explained above, the first embossing nip 16 is formed by the first rigid roll 10 and the second rigid roll 12. The second embossing nip 18 is formed by the second rigid roll 12 and the resilient roll 14.

The first rigid roll 10 is made of relatively hard materials. Suitable materials for the first rigid roll 10 are, for example, steel, hardened steel, hardened aluminum, and ceramic. The second rigid roll 12 is also made of relatively hard materials. Suitable materials for the second rigid roll 12 may be the same as the materials for the first rigid roll 10. Preferably, the first rigid roll 10 and the second rigid roll 12 are made of the same material. Alternatively, the first rigid roll 10 and the second rigid roll 12 may be made of different materials from one another. The resilient roll 14 is made of relatively soft materials. Suitable materials for the resilient roll 14 is, for example, rubber, and

polymers. The resilient roll 14 is relatively softer than the second rigid roll 12 which is maintained in contact with the resilient roll 14.

Referring to FIG. 8 as well, the first rigid roll 10 has a pattern of first male elements 22 protruding from the surface 20 of the first rigid roll 10. The second rigid roll 12 has a pattern of female elements 24 indenting from the surface 26 of the second rigid roll 12. The pattern of the first male elements 22 is arranged to engage the pattern of the female elements 24 as the first rigid roll 10 and the second rigid roll 12 rotate. The first rigid roll 10 and the second rigid roll 12 are disposed to have a clearance therebetween to avoid interference as the rolls rotate. The pattern of first male elements 22 corresponds to the first embossing pattern 122 provided on the cellulosic fibrous web shown in FIG. 3. Each of the first male elements 22 corresponds to each of the first embossed elements 128 shown in FIG. 3. The engagement of the pattern of first male elements 22 and the pattern of female elements 24 provides the cellulosic fibrous web 2 with the first embossing pattern 122. For illustrative purposes, the numbers of the male elements, the female elements, etc. on the rolls shown in FIGS. 8-10 are simplified.

The first rigid roll 10 also has a pattern of recesses 30 provided on and indenting from the surface 20 of the first rigid roll 10. The second rigid roll 12 has a pattern of second male elements 28 protruding from the surface 26 of the second rigid roll 12. The pattern of second male element 28 corresponds to the second embossing pattern 124 provided on the cellulosic fibrous web shown in FIG. 4. Each of the second male elements 28 corresponds to each of the second embossed elements 138 shown in FIG. 4. As shown in FIG. 9, the pattern of second male elements 28 is arranged to maintain noncontact with the first rigid roll 10 as the rolls rotate such that the pattern of second male elements 28 does not substantially provide an embossing pattern on the cellulosic fibrous web 2 in the first embossing nip 16. The pattern of recesses 30 provided on the first rigid roll 10 receives the pattern of second male elements 28 of the second rigid roll 12 as the rolls rotate. The recess 30 and the second male element 28 should have a sufficient clearance not to substantially impart an embossing pattern on the cellulosic fibrous web 2. The recess 30 has a depth from the surface 20 of the first rigid roll 10. The second male element 28 has a height from the surface 26 of the second rigid roll 12. The dimension of the depth of the recess 30 is preferably greater than the dimension of the height of the second male element 28. The recess 30 has the area covers the second male elements 28 corresponding to the second embossed elements 138 which form one decorative indicia 140 shown in FIG. 4 (for illustrative purposes, only two second male

elements 28 covered by the recess 30 are shown in the embodiment shown in FIG. 9). The recess 30 also has the area preferably equal to or smaller than the area of one of discrete, distinctive land 132 shown in FIG. 3.

The resilient roll 14 has a smooth and resilient surface 32 which is capable of deforming upon pressure. The pattern of the second male elements 28 on the second rigid roll 12 is maintained in contact with the resilient surface 32 of the resilient roll 14 such that the resilient surface 32 deforms. Therefore, the cellulosic fibrous web 2 intervening between the second male elements 28 and the resilient surface 32 is impressed and is provided with the second embossing pattern 124. The embossing system formed by the resilient roll 14 and the rigid roll 12 enables to form visually clearer embossed elements than the nested two rigid rolls because the rigid to resilient embossing system is capable of giving greater deflection of smaller aesthetic embossed pattern at a lesser extent of physical damages to the web.

In operation, the cellulosic fibrous web 2 is provided into the first embossing nip 16 as shown in FIG. 8. The cellulosic fibrous web 2 is embossed in the first embossing nip 16 and conforms to the shape of the first male elements 22, thereby creating the first embossed elements 128 on the web 2. As the rolls 10 and 12 rotate as shown in FIG. 9, the first male elements 22 separate from the surface of the cellulosic fibrous web 2 while the cellulosic fibrous web 2 remains on the second rigid roll 12 and travels with the second rigid roll 12. The recess 30 becomes to face and receive the second male elements 28. Because there is a sufficient clearance between the recess 30 and the second male elements 28, the intervening cellulosic fibrous web 2 is not substantially provided with an embossed element in the first embossing nip 16. The cellulosic fibrous web 2 further travels with the second rigid roll 12 toward the second embossing nip 18 as shown in FIG. 10. The cellulosic fibrous web 2 is impressed between the second male elements 28 and the surface 32 of the resilient roll 14 to form the second embossed elements 138 on the cellulosic fibrous web 2. The second embossed elements 138 are formed by impression, therefore the second embossed elements 138 are clearer than the first embossed elements 128 formed between the nested two rigid rolls 10 and 12. Further, the first embossed element 128 and the second embossed elements 138 are formed to extend opposite with respect to the unembossed surface 6. Therefore, the first embossed elements 128 and the second embossed elements 138 provides more visual contrast to the consumers.

It should also be understood that all of the limits and ranges specified herein include all narrower ranges, limits, and amounts that are within the specified limits and ranges and that such narrower ranges and limits may be claimed even though those limits and ranges are not separately listed.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A method of embossing a cellulosic fibrous web, the embossing pattern comprising a first embossing pattern having first embossed elements and a second embossing pattern having second embossed elements, the method comprising:

embossing the web in a first embossing nip formed between a first rigid roll and a second rigid roll, wherein the first rigid roll has a pattern of first male elements, the second rigid roll has a pattern of female elements and a pattern of second male elements, wherein the pattern of first male elements is arranged to engage the pattern of female elements as the rolls rotate such that the engagement of the patterns provides the web with the first embossing pattern, the pattern of second male elements is arranged to maintain noncontact with the first rigid roll as the rolls rotate such that the pattern of second male elements substantially does not provide an embossing pattern on the web in the first embossing nip, and

embossing the web in a second embossing nip formed between the second rigid roll and a resilient roll, wherein the pattern of second male elements is arranged to maintain contact with the resilient roll so as to provide the web with the second embossing pattern.

2. The method of Claim 1 wherein the first rigid roll has a pattern of recesses, wherein the pattern of recesses is arranged to receive the pattern of second male elements as the rolls rotate.

3. The method of Claim 2 wherein the first embossing pattern comprises a background matrix and a plurality of discrete, distinctive lands, the background matrix is formed by the first embossed elements, and the discrete, distinctive land is defined by being substantially surrounded by the first embossed elements.

4. The method of Claim 3 wherein the discrete, distinctive land is unembossed.

5. The method of Claim 4 wherein the second embossed element forms a decorative indicia inside of the discrete, distinctive land.

6. The method of Claim 2 wherein the recess has a depth from the surface of the first rigid roll and the second male element has a height from the surface of the second

rigid roll, wherein the dimension of the depth of the recess is greater than the dimension of the height of the second male element.

7. The method of Claim 6 wherein the recess has the area covering at least the entirety of one decorative indicia.

8. The method of Claim 7 wherein the recess has the area equal to or smaller than the area of one discrete, distinctive land.

9. The method of Claim 8 wherein the second male element maintains contact with and deforms the surface of the resilient roll such that the intervening web is impressed.

10. An embossed cellulosic fibrous web made according to the method of Claim 1 wherein

the first embossed elements and the second embossed elements extend opposite one another,

the first embossing pattern comprises a background matrix and a plurality of discrete, distinctive lands, the background matrix is formed by the first embossed elements, the discrete, distinctive land is defined by being substantially surrounded by the first embossed elements, and

the second embossed elements are arranged to form a decorative indicia inside of the discrete, distinctive land.

11. The embossed cellulosic fibrous web of Claim 10 wherein the discrete, distinctive land is unembossed.

12. The embossed cellulosic fibrous web of Claim 11 wherein the background matrix has a density of from 40 to 90 of the first embossed elements per square inch.

13. The embossed cellulosic fibrous web of Claim 12 wherein one discrete, distinctive land corresponds to the size eliminating from 4 to 90 of the first embossed elements from the background matrix.

14. The embossed cellulosic fibrous web of Claim 13 wherein the embossing pattern comprises a composite repeating pattern, one composite repeating pattern

comprises one first repeating pattern of the first embossing pattern and one second repeating pattern of the second embossing pattern, wherein one first repeating pattern includes at least one discrete, distinctive land, wherein the total area of the discrete, distinctive lands in one first repeating pattern occupies from 3 % to 35 % of the area of one first repeating pattern.

15. The embossed cellulosic fibrous web of Claim 14 wherein the first embossed element has the area of from 0.006 $inch^2$ to 0.024 $inch^2$.

16. The embossed cellulosic fibrous wen of Claim 15 wherein the discrete, distinctive land has the area of from 0.025 $inch^2$ to 3.3 $inch^2$.

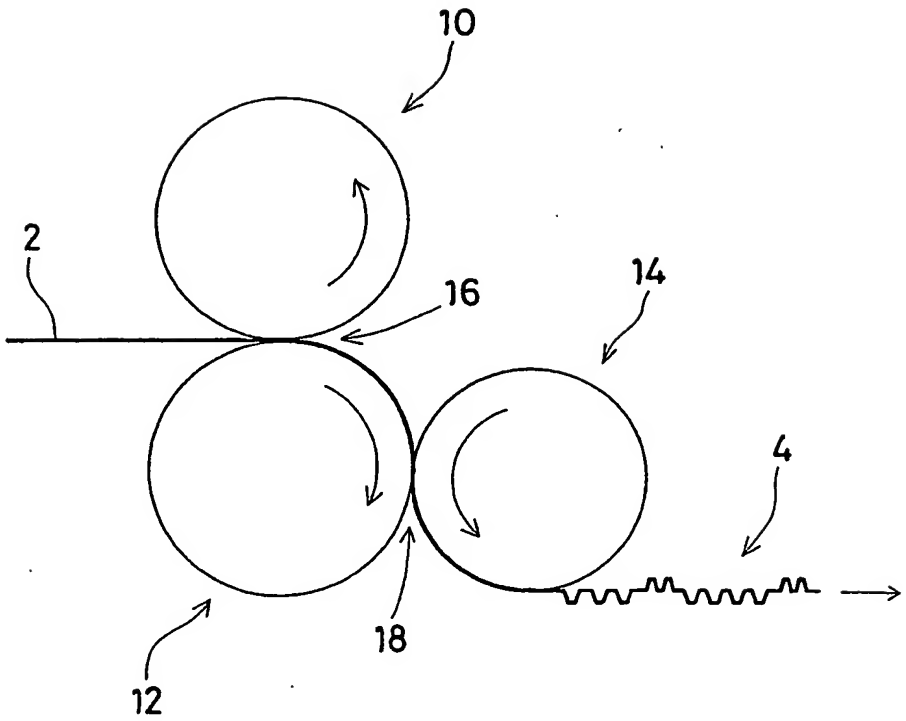

FIG. 1

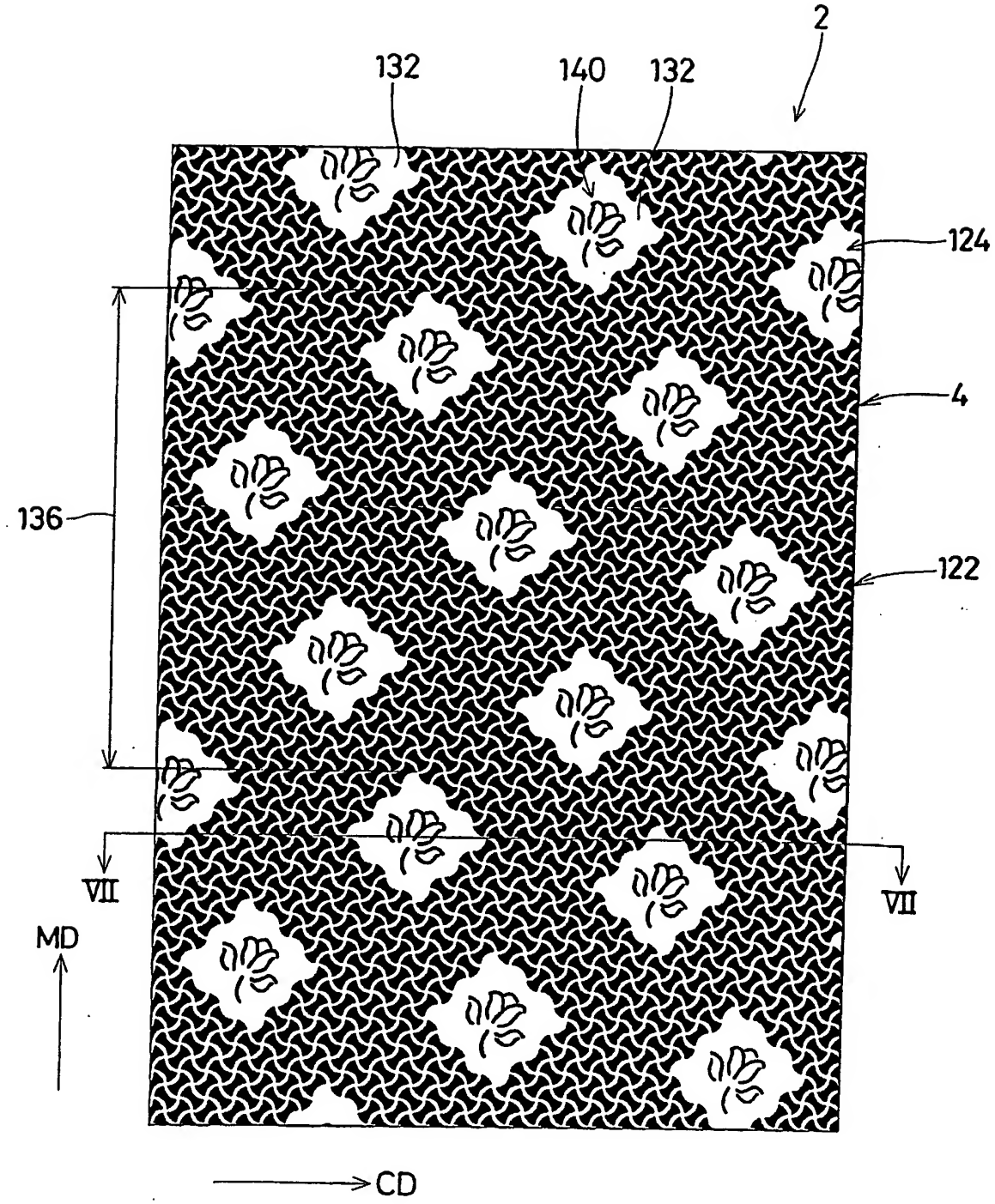

FIG. 2

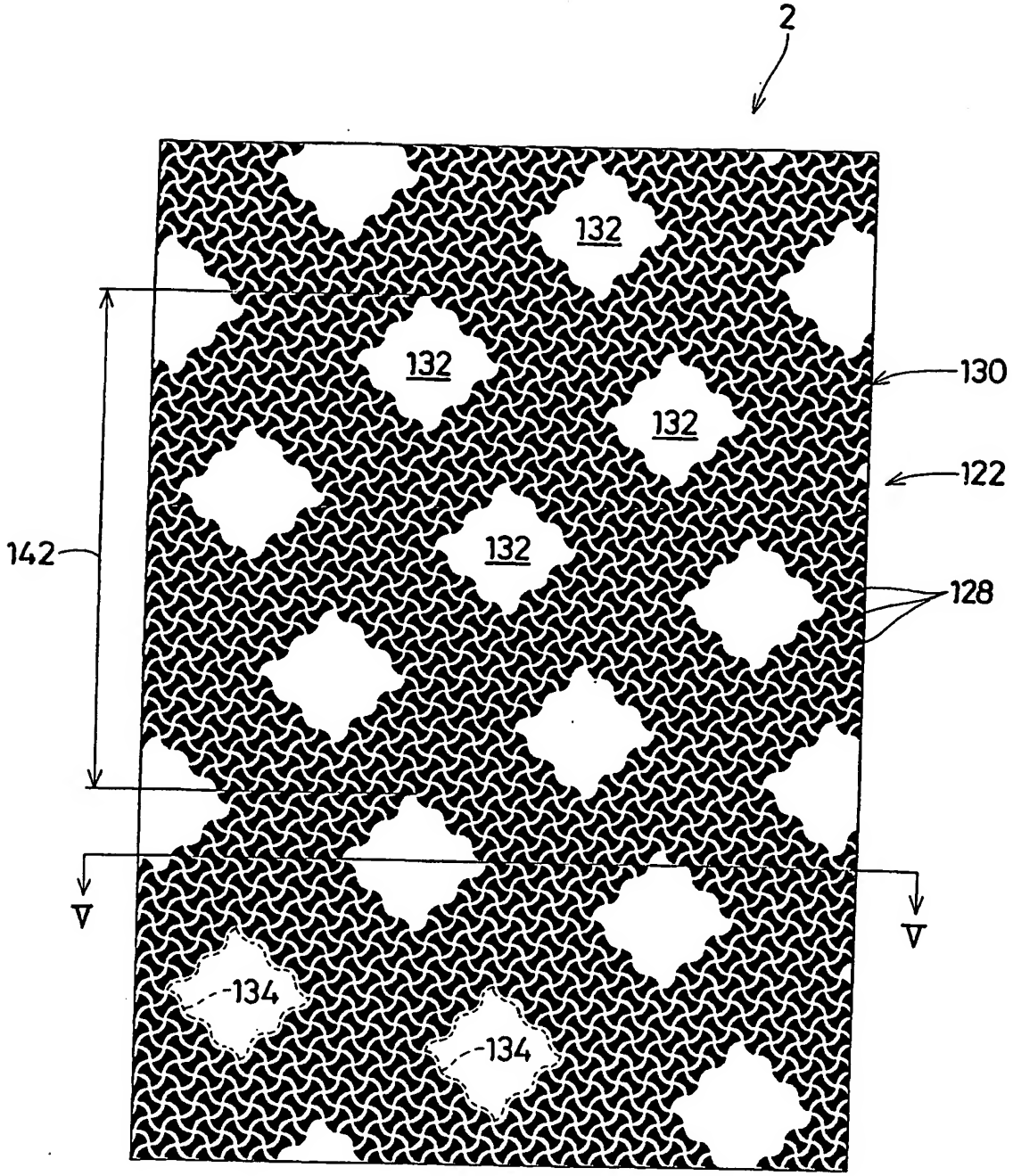

FIG. 3

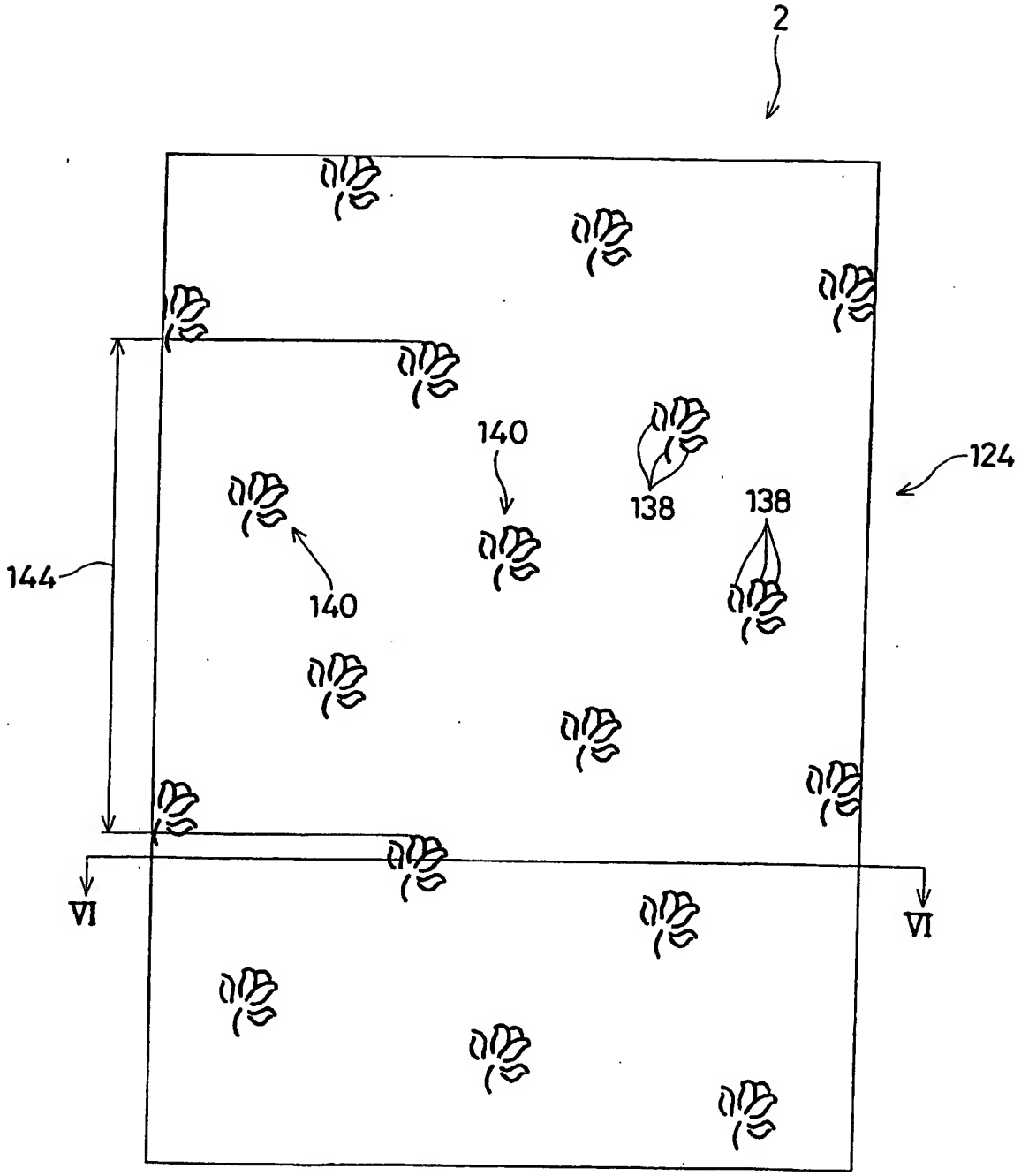

FIG. 4

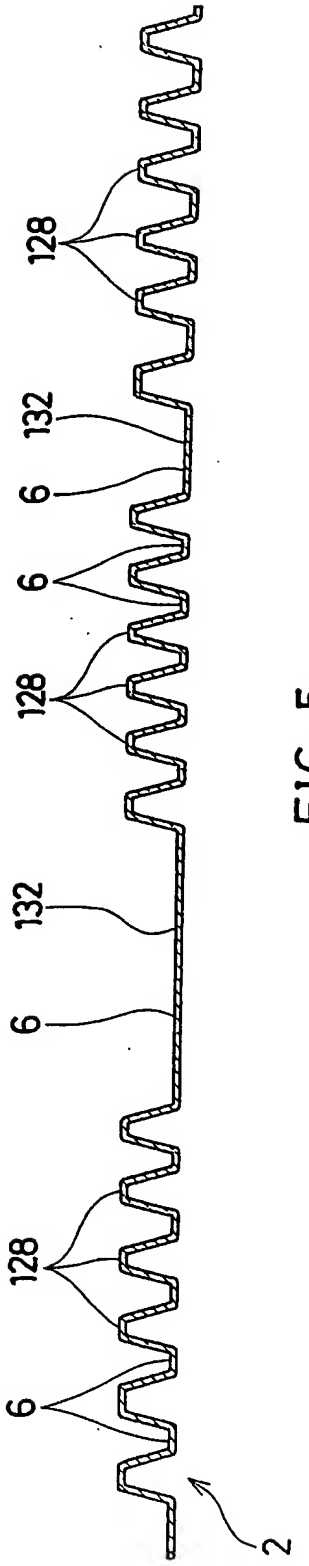

FIG. 5

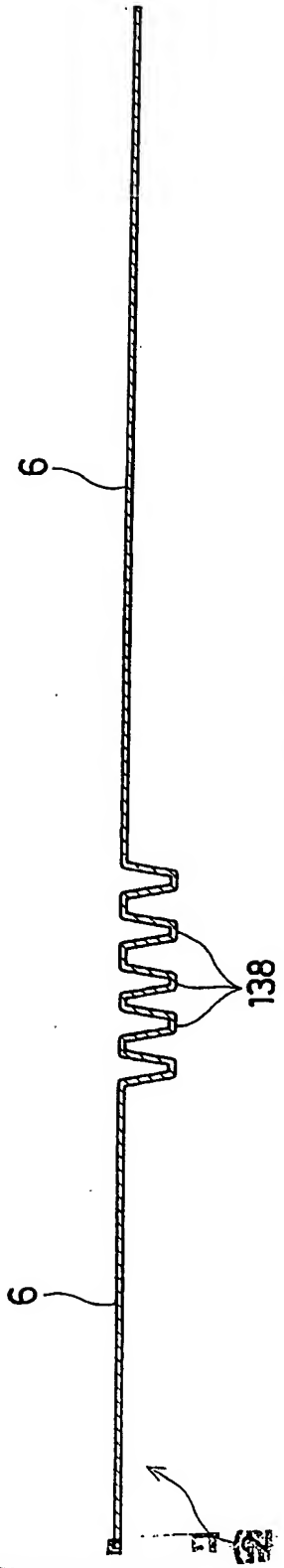

FIG. 6

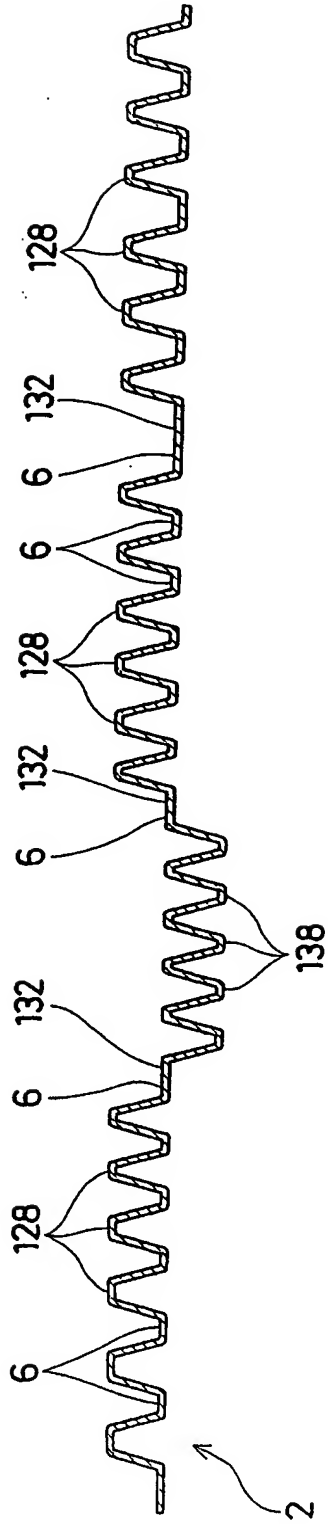

FIG. 7

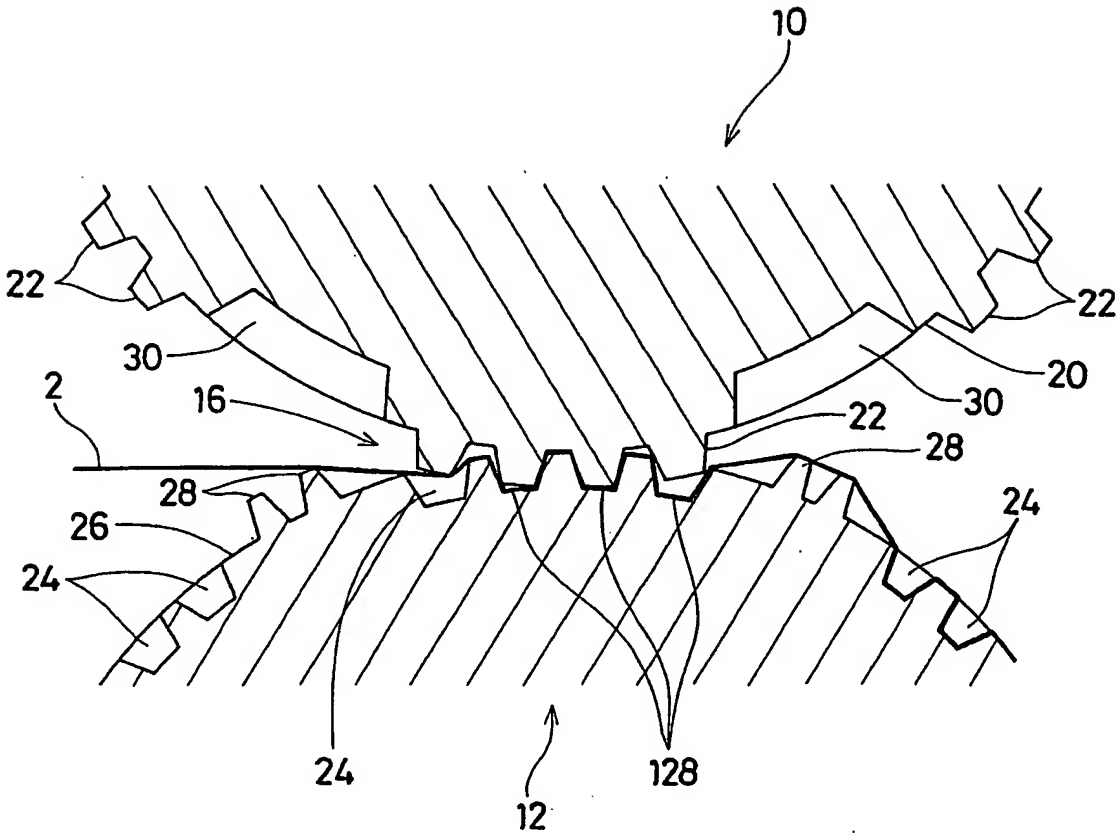

FIG. 8

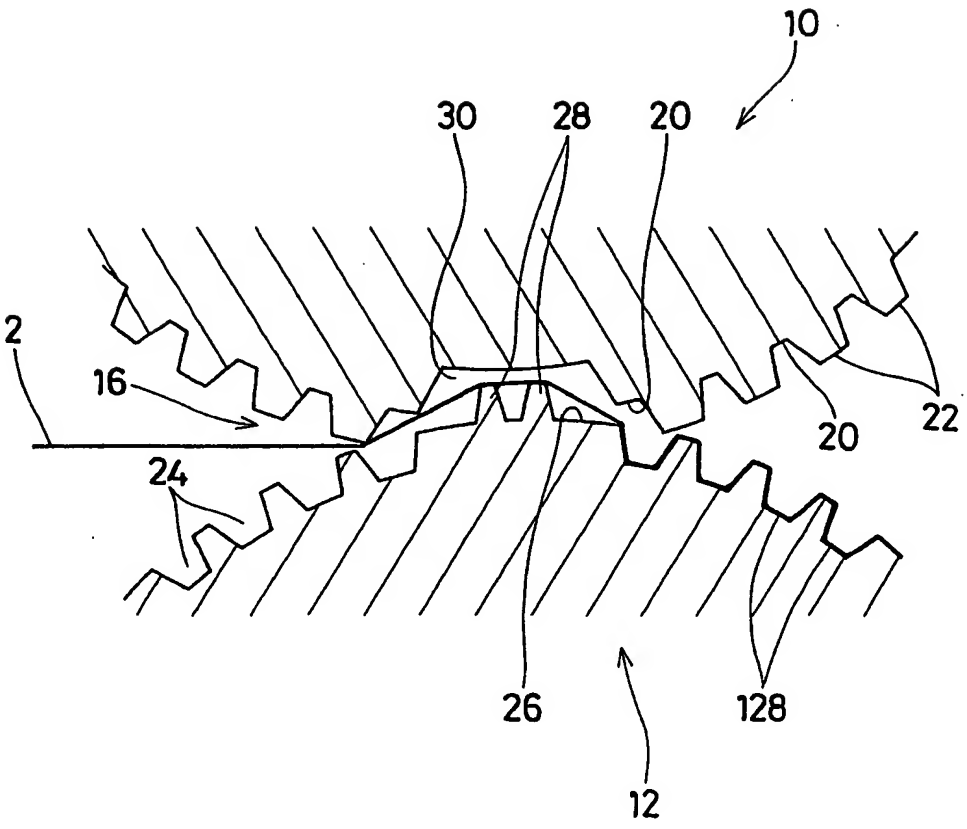

FIG. 9

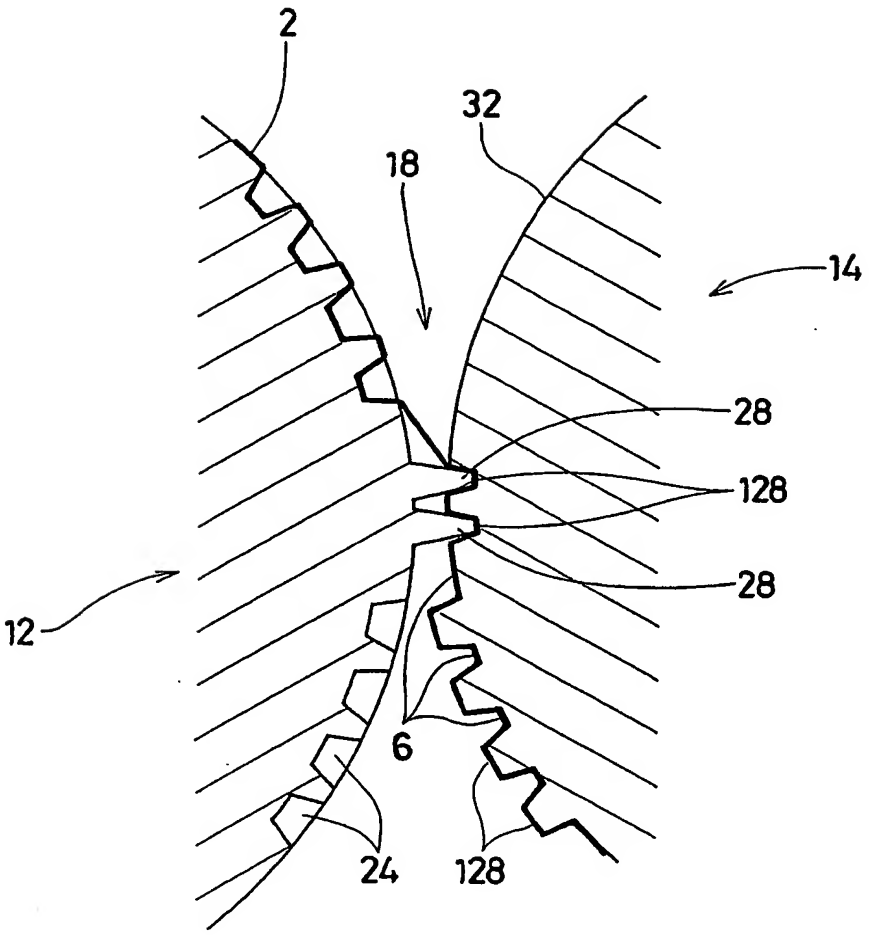

FIG. 10

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/US 99/11778

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B31F1/07

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B31F D21H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 408 248 A (JAMES RIVER CORP) 16 January 1991 (1991-01-16) column 5, line 49 -column 6, line 6; figure 3	1,2,9
A	---	3-16
A	US 5 597 639 A (SCHULZ GALYN A) 28 January 1997 (1997-01-28)	
A	--- US 5 269 983 A (SCHULZ GALYN A) 14 December 1993 (1993-12-14) cited in the application	
A	--- US 5 779 965 A (GRUBER DAVID ROBERT ET AL) 14 July 1998 (1998-07-14) cited in the application	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 November 1999	22/11/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Soederberg, J

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter nal Application No
PCT/US 99/11778

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